NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

WATERSPREADING

(Acre)

CODE 640

DEFINITION

A system of dams, dikes, ditches, or other means of diverting or collecting runoff from natural channels, gullies, or streams and spreading it over relatively flat areas.

PURPOSE

Supplement natural precipitation in areas where plants can effectively use additional moisture.

CONDITIONS WHERE PRACTICE APPLIES

Waterspreading differs from irrigation in that applications are timed by the availability of natural runoff flow rather than scheduled to meet plant needs. This standard does not apply to Conservation Practice Standard 443, Irrigation System, Surface and Subsurface.

Although applicable to any climatic condition, areas with an average annual precipitation of 8 to 25 inches show the greatest benefit from waterspreading.

Waterspreading systems apply to areas where:

- Local, state, and federal laws and regulations will permit development.
- Soils have suitable intake rates and adequate water-holding capacities for the type of system and crops to be grown.
- Topography is suitable for the diversion or collection and the use area allows uniform spreading of water to achieve the desired result.
- A system can be installed that allows for the economical production of feed, forage, or grain crops.
- Climatic conditions are such that the additional moisture can be expected to improve plant growth.
- Runoff and streamflow are available at the time of year, of suitable quality, and in a volume sufficient to increase plant growth.
- Flows can be collected or diverted and spread, and excess water can be returned without causing excessive erosion.
- Fish, wildlife, and cultural resources will not be adversely affected.
- Grazing of the spreading area can be controlled.

CRITERIA

General Criteria Applicable to All Waterspreading Systems

Laws, rules, and regulations. This practice shall conform to all federal, state, and local laws, rules, and regulations. Laws, rules, and regulations of particular concern include those involving water rights, land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Drainage area. The contributing area (or ratio of watershed area to benefited area for a "dependable" water supply) must be such that the volume of divertable flow needed for the design water application can be expected on an average of 8 years in 10.

Systems with less than a "dependable" water supply are classified as "questionable." To be economical, these systems must typically be less expensive to construct and must furnish at least the application volume that can be expected 1 year out of 2.

Diversion works. The diversion works should be automatic, requiring no manual control to divert the stream into the conveyance system or onto the spreading areas (except on watercourses with expected flow durations of more than 24 hours).

The waterspreading system must be capable of safely conveying the design peak flows through the system or bypassing them at the diversion. Suitable diversion controls should normally be provided so that only the desired rate of flow enters the conveyance system.

Where significant sediment is present in flood flows (amounts that will either reduce the life of the system or damage soil characteristics), a low-flow bypass must be installed to exclude bedload from the system.

Inlet control(s) must be adjustable to exclude flow from the spreading areas at undesirable times such as when crops are to be harvested mechanically. The diverted flow must not cause undue maintenance problems in the diversion works, conveyance system, or the spreading area.

Conveyance system. The conveyance system shall have the capacity to safely convey the design flow from the diversion works to the spreading area.

Spreading area. Ditches, dikes, diversions, conduits, and similar structures will be arranged and located to spread diffused flow over the land surface or to pond water over the land, depending on the type of system selected. All slopes will be stable and graded to the slope necessary for management and harvesting operations. Land leveling, land forming, land smoothing, obstruction removal, and similar practices may be performed for more uniform distribution of water and increased operation efficiency. All component practices, installed as part of the overall system, will comply with the conservation practice standard for that practice.

If the water is to be spread over the area as diffused flow, the depth of application should be the approximate depth of water that the soil will absorb in the period equal to the estimated flow duration. For soils that have rapid or very rapid permeability, this depth may be more than is needed to fill that root zone.

If the water is to be impounded on the spreading area, the depth of application should approximately equal the available moisture capacity of the soil profile for the effective root zone of the plants to be grown. Rapidly permeable soils are generally unsatisfactory for impoundment systems. The system should be designed and managed to minimize deep percolation.

Outlet works. A provision must be made for returning excess water from the system to the stream channel or other parts of the system without causing excessive erosion and in time to prevent crop damage by ponded water. The flow line of the structure used for this purpose should be below ground level to improve flow characteristics.

Additional Criteria Applicable to Detention-Type Waterspreading Systems

Topography. Detention type systems are ideally suited to uniform, gently sloping land. Care must be taken to provide drainage for each basin by grading a channel along the topside of each dike toward each drain.

Water impounding dike. The maximum depth of water impounded against dikes will be 3 feet. Water depth greater than this requires embankment design according to Conservation Practice Standard 378, Pond.

The minimum top width of dikes at design top elevation will be 4 feet. The freeboard from the design water surface to the dike top shall be 1 foot or the wave height from the wind and fetch length calculations, whichever is greater. (See the "Outlet works" Section below for added criteria.)

Side slopes of dikes will not be steeper than 2 horizontal to 1 vertical (2:1). They should be flatter as needed for stability and 4:1 or flatter for safe mowing or other operation of farm equipment.

Outlet works. Dikes with a total water storage capacity less than the 10-year, 24-hour runoff volume from the contributing area must have at least one outlet or overflow section that is at least 1 foot below the design top elevation. This may be a vegetated spillway, stable rock, weir overflow structure, pipe outlet, or some combination of these.

The minimum design inflow rate is (1) the maximum diverted rate of flow or (2) the 10-year, 24-hour peak flow from the contributing area, whichever is less. Total capacity of the outlet must exceed the routed design inflow to the impoundment.

Vegetative Cover. All areas where vegetation has been disturbed during construction should be seeded following completion of construction. Seedbed preparation, seeding, sodding, fertilizing, and/or mulching shall comply with Conservation Practice Standard 342, Critical Area Planting.

CONSIDERATIONS

When planning a waterspreading system, consider other practices needed such as brush removal, fencing, and seeding.

Consider the crops to be grown. Potential benefits are highest with forage, hay, or seed crops having maximum effective rooting depth.

Consider the effect on soils. Do not install a waterspreading system on soils where the hazard of erosion is high. Include erosion control at the diversion works, within the spreading area, and at the outlet facilities as an integral part of the waterspreading system.

Consider the effects of livestock use on the spreading areas. Manage livestock to prevent compaction when soils are wet and to prevent range degradation by overuse.

Consider detention area slopes. Slopes greater than 2 percent should generally be avoided. Cost escalates rapidly as slope increases. The effective basin slope may be flattened by taking the borrow along the top of each basin (immediately below the next dike above).

Consider the reduction of downstream surface water quantity and effects on potential users. Evaluate both the volume of water diverted and the volume of return flows.

Consider the effects of increased soil moisture and ground water quantity on the waterspreading areas.

Consider sediment, pathogens, adsorbed and dissolved nutrients and pesticides, and soluble chemicals infiltrating into the waterspreading areas.

Consider potential chemical degradation of return flows leaving the waterspreading areas. Consider the rate and volume of return flows, chemicals used, time of chemical application in comparison to predictable storm events, and the nature of sediments transported.

Consider potential ground water degradation from applied chemicals caused by increased infiltration. Important factors include available soil moisture storage, evapotranspiration, type and amounts of chemicals used, and saline geology.

PLANS AND SPECIFICATIONS

Plans and specifications for waterspreading shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be developed for use by the landowner or operator. The plan should be consistent with the purposes of the practice, intended life, and the criteria for its design.

Minimum operation requirements to be addressed in the O&M plan are as follows:

1. Specific instructions and operational requirements to safely divert the desired volume of water into the system, store as applicable, and release return flows
2. Average water yields by event, times to fill and empty the system, and any other hydrologic and hydraulic information needed to operate the system as designed
3. Soils infiltration and water-holding capacities, anticipated crops to be grown, effects of inundation, and any other information that will assist the operator in making sound economic and environmental decisions

Minimum maintenance requirements to be addressed in the O&M plan are as follows:

1. Prompt service, repair, or replacement of components as necessary to maintain their full function

2. Removal of debris and foreign material from structures, ditches, and other components that might hinder operation
3. Maintenance of good vegetative cover on all slopes and watercourses